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Control of lichens, moulds and similar growths

Algae, lichens and mosses are often found on external surfaces of buildings, especially in rural districts. Their appearance is often regarded as desirable and they are rarely destructive although they may have undesirable effects. Means of encouraging their growth, and of destroying them, are set out in this digest.

Mould growths on internal surfaces are evidence of dampness which should be cured before the affected surface is treated with one of the toxic washes recommended. Moulds may also grow on external paintwork.

The growths discussed in this digest are those that are to be found on building materials, in conditions where their needs of moisture, food and light are met. Some of them need only moisture, minute quantities of mineral salts, and light; others require more elaborate food materials but do not need light. For the purpose of the digest it is not necessary to identify the organisms but some of their characteristics are set out in the table on page 2. When established, they can exist under a wide range of moisture conditions and many can withstand drying dust; for active growth they require a fairly high level of moisture in the building material or an atmospheric humidity of over 85 per cent. At lower relative humidities growth is slower and ceases below 70 per cent. In this country, moisture conditions are more generally favourable on northern than on southern aspects, though lichens often flourish on south-facing substrates.

External surfaces

Lichens and mosses are commonly seen on roofs and outer walls in rural districts. The resulting appearance is often regarded as mellow and pleasing, and it may be desired to encourage rather than destroy them, particularly where there is a harsh contrast between old surfaces and new materials introduced in the course of repairs. A traditional method for encouraging growth is to apply a wash of cow dung and water; human urine or skimmed milk are also said to be effective. Algae occur in most districts where water runs freely over a surface and cause unsightly green or black stains.

Although organisms are rarely destructive, their acidic metabolic products can weaken asbestos-cement and eat into limestone. Lichens may obscure carvings and inscriptions; algae may produce disfiguring stains on masonry, brickwork or renderings; mould may attack paints and plastics. Moss may impede the shedding of water from roofs or lead to blockage of gutters and downpipes. Where it is desired to prevent or destroy such growths, one of the toxic washes discussed below may be used. These take a few days to become effective and, in wet weather, may be washed out before they have time to act. They should preferably be applied during a dry spell; the action is hastened if thick surface growths are partly removed or torn with a wire brush and the wash then well brushed in. The wash, repeated if necessary, kills the growth but the dead organism takes some time to disappear. If the wall is to be painted or rendered, the dead matter must be removed so as to obtain a good bond for the new finish; this may be done by scraping or wirebrushing and is often more effective when the dead organism is dry. (Do not scrape or wirebrush asbestos-cement except when wet). A further toxic wash at this stage, whether or not the wall is to be painted or rendered, can delay re-establishment of the growth.

The effective life of the treatment depends on the porosity of the surface and on the extent to which it is washed by rain: on a porous sheltered surface, growth may be prevented for two or three years; a dense concrete or a cement paint finish may require retreatment at the beginning of each rainy season. The application of a colourless water-repellent after the toxic wash has dried will increase the effective life of the wash, but it should be remembered that the use of a water-repellent may not always be appropriate[1] and may interfere with subsequent redecoration, for example, with cement paint.

Mould and algal growths resembling dirt deposits occur outdoors on paint surfaces and wood stains. In the early stages they can be washed off but moulds may penetrate and damage the films. Coat-

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Technical enquiries arising from this Digest should be directed to Building Research Advisory Service at either of the above addresses.

Organic growths on buildings

Organism	Food needed from surface	Light requirements	Appearance	Remarks
Algae	Mineral salts	Necessary	Green, red or brown powders or filaments which may or may not be slimy according to the conditions	May occur on all types of building surfaces outdoors
Lichens (combinations of certain algae and fungi)	Mineral salts	Necessary	Leathery plates of tissue with crinkled edges and often with cup-shaped fruit bodies—usually orange or grey	May be found on stone and slate, on asbestos-cement roofs and decking tiles, concrete roofing tiles and renderings, and other concrete surfaces
Liverworts and mosses	Mineral salts	Necessary	Some liverworts occur as leathery tissue with smooth edges, not unlike lichens in appearance; others resemble mosses	Usually found in angles, crevices and on surfaces where soil and dirt have accumulated
Fungi (moulds, mildew and yeasts)	Organic material	Unnecessary	Moulds appear as spots or patches which may spread to form a furry layer on the surface—grey green, black or brown. Mould may grow within a paint film causing a stain, usually pink or purple, but the mould itself may not be visible	May be found on paint, distemper, wallpaper or the paste used to fix it, and on dirt and dust when these contain suitable food; vinyl finishes may be stained. Yeasts have been found occasionally in places where appropriate nutrients were available
Bacteria	Various	Unnecessary	Not visible individually to the naked eye	Sulphate-reducing bacteria in gypsum plaster may cause dark stains in paints containing lead and may promote deterioration of limestone and corrosion of steel

ings vary in their susceptibility but few are positively resistant throughout their life.

Internal surfaces

Mould growth on internal surfaces is evidence of dampness. This may be due to rain penetration, to deficiencies in damp-proof coursing, leakage from plumbing, defects in the rainwater disposal system, or to condensation. Moulds may also appear in a new building before the water used in construction has dried out; during this period, flueless gas, paraffin or oil heaters should not be used to accelerate drying because of the large amount of water vapour they produce.

The course of dampness should first be cured[2] and the walls allowed to dry thoroughly before any further step is taken. It may not always be practicable to achieve this completely but a partial cure is better than none at all. In breweries and bakehouses, conditions may be conducive to mould growth even if the ventilation is good.

Where the organism is growing on undecorated stone, brick or concrete, a toxic wash should be applied to the affected surface and its surroundings. After a suitable interval the area should be brushed down and rinsed with a small quantity of water if this is necessary to restore its appearance. The treatment should be repeated if any signs of new growth become apparent.

On decorated surfaces, the procedure will depend on the type of decoration and the extent to which it is affected. In general, decoration that has been attacked should be stripped; the surface should be sterilised by application of a toxic wash and kept under observation for a week or so, a further wash being applied if there are signs of renewed growth. When dry, the surface may be redecorated. If the area of attack is small, local stripping and sterilisation may be all that is required.

Where attack is slight and the existing decoration will withstand treatment with a toxic wash and is sufficiently absorptive to be impregnated by it, it may be sufficient to clean down without stripping and then to apply the toxic wash, allow to dry and redecorate. Oil-bound distemper, which may be difficult to strip, can sometimes be dealt with in this way.

Vinyl wall-coverings are relatively impermeable to moisture and prone to encourage mould growth beneath them on damp or freshly-built walls producing pink or black stains. The recommended fungicidal adhesives are essential but these may not be effective in excessively damp conditions.

In food-processing and other rooms where condensation is prevalent, organisms may grow in dust deposited on the surfaces. Such surfaces should be kept clean by frequent washing. Where they are painted the use of a paint incorporating a toxic

ingredient will prevent the growth of organisms in the paint film at least for some time; the protection afforded is particularly valuable during the early life of the paint film when it is most sensitive to attack.

Toxic washes

Some toxic washes are listed on page 4. Their efficiency will vary according to the circumstances. Household bleach is readily available and is effective with a wide range of organic growths but has no residual activity.

Although it is undesirable in principle to introduce soluble salts, particularly sodium salts, into porous building materials, there is no evidence that, in the concentrations mentioned, any of these washes will harm building materials.

Care in use

All of the toxic materials listed must be used with great care. Many of them are caustic in concentrated solutions but even solutions diluted ready for use should if splashed on the skin be washed off immediately with soap and water. Particular care should be taken to ensure that they are not splashed into the eyes. Formalin used in an enclosed space is a health hazard unless good ventilation is arranged.

If an area of skin larger than about 30 cm^2 is affected, do not delay in transporting the person concerned to the nearest hospital and tell the medical staff the nature of the material being used.

Certain uses of these pesticides are already subject to control under the Pesticides Safety Precautions Scheme[3] and impending extensions of the Scheme are likely to cover other uses in the near future. In particular, all uses of pesticides, pesticidal products or pesticidal services by central and local government and public authorities are subject to control. Advice can be obtained from the secretariats.[4]

The instructions about care and safety issued by the suppliers should be followed meticulously.

Redecoration (*see also Digests 197 and 198*)

Where there may be moisture in the backing, a fairly porous type of decoration—distemper, matt emulsion paint, flat oil paint—will allow drying to continue. When the source of moisture is heavy condensation, an impermeable finish, eg high gloss paint and polyurethane paint are likely to be most durable. They will not allow condensed moisture to reach the backing but have the disadvantage that condensed moisture may run or drip from the surface. Anti-condensation paints may prevent this but often these are less suitable where a readily cleaned finish is required; mould-resistant varieties are available.

If condensation arises from a commercial process that can be interrupted for no more than a short time, if at all, the surface should be made as dry as possible before the decoration is applied; if necessary it should be dried out carefully with a blow-lamp or an electric heater. Asbestos-cement, however, is liable to shatter if it is strongly heated; it should not be dried with a blow-lamp and great care should be taken if an electric heater is used. Similar care is needed when drying gypsum plaster; overheating may decompose it.

Mould-resistant paints Decorative paints containing toxic ingredients are difficult to obtain in small quantities. Special types are supplied by several manufacturers for industrial applications where control of dampness is not possible, eg cellars and breweries. Some may not be compatible with normal decorative paints. Toxic ingredients in paint protect only the paint film; they do not sterilise an infected backing or prevent the growth of organisms in dirt deposited on the paint film. Mercurial compounds have been used in the past but fungicides less toxic to man are now available. It is not usually possible to obtain paints with a specified fungicide and manufacturers rarely divulge the agents they incorporate.

Paints for external walls vary in susceptibility to algae and few additives seem entirely successful. Paints with a cement base or emulsion binder tend to be rather more affected than those with a chlorinated rubber basis. The garden fungicide captan, which is available in small quantities under several proprietary names, is fairly safe and effective in paint and may be worth a trial for the treatment of persistently affected areas such as wood and metal window frames and inside damp cupboards. It must be fully dispersed to avoid coarse particles in the film; this can be done by rubbing out in a little of the paint with a spatula on a glass sheet and stirring the smooth paste into the rest of the paint. Contact with the skin and inhalation must be avoided. About 10g per litre of paint is required. This fungicide is compatible with most gloss and emulsion paints but some preparations might adversely affect some paints.

References

1 Colourless treatments for masonry; BRE Digest 125; HMSO
2 Protection from rain; Building Research Establishment, Garston, Watford WD2 7JR; 50p
3 Pesticides Safety Precautions Scheme, Pesticides Branch MAFF, Great Westminster House, Horseferry Road, London SW1P 2AE
4 Plant Pathology Laboratory, Hatching Green, Harpenden, Herts AL5 2BD
Pest Infestation Control Laboratory, Block B, Government Buildings, Hook Rise South, Tolworth, Surbiton, Surrey KT6 7NF
Health and Safety Executive, Occupational Medicine and Hygiene Laboratory, 403 Edgware Road, London NW6 6LN

Some toxic washes

Material	Strength for use	Form	Supplier	Notes
Sodium hypochlorite Household bleach *Blue Circle Fungicide*	1 part to 4–5 parts water (by volume) As directed	Liquid	Hardware stores etc. Builders' merchants	Effective against many organisms and will bleach the colour of dark ones; may change the colour of paints and some building materials; no active residue; rinse off with cold water
Sodium borate *Polybor*	5% solution in water	Powder	Borax Consolidated Ltd, Borax House, Carlisle Place, London SW1	Safe to handle; wash off non-porous surfaces
Copper carbonate Ammonia solution (sp gr 0.880) Water	30g 300 ml 50 litres		Pharmacists	Will destroy algae and lichens but may stain some materials; test on a small area; remains active if not washed off; useful on roofs
Zinc or magnesium fluorosilicate (formerly described as 'silicofluoride')	4% solution in water (1 kg to 25 litres)	Crystals	Laporte Industries Ltd, General Chemicals Division, Moorfield Road, Widnes WA8 0HE	Long-term effect
Formalin (40% formaldehyde)	5% solution in water	Liquid	Pharmacists	Evaporates, leaving no active residue; choking smell; no bleaching action
Sodium pentachlorophenate *Brunobrite*	2% solution in water As directed	Liquid	Stanhope Chemical Products Ltd, Victory House, 99–101 Regent Street, London W1	Some residual effect; mainly used on moulds and fungi
Cuprinol dry rot killer	As directed	Liquid	Cuprinol Ltd, Adderwell, Frome, Somerset	
Santobrite	As directed	Prepared solution	Monsanto Chemicals, 10 Victoria Street, London SW1 (bulk supply only)	
Sodium orthophenylphenate *Brunosol*	2% solution in water As directed	Concentrate	Stanhope Chemical Products Ltd	For sterlising walls after infection; may be left on for painting or papering
Chlorinated phenolics				Some residual effect
Panacide (Dichlorophen)	Use neat or dilute as required	Aqueous soln	BDH Ltd, Poole, Dorset	Algicide
Halophane (incl other active compounds)	Use neat or dilute as required	Aqueous soln	Mould Growth Consultants Ltd McMillan House, Cheam Common Road, Worcester Park, Surrey	Effective against bacteria, algae, moulds and lichens
Thaltox C	As directed	Liquid	Wykamol Ltd, 21 Hyde Street, Winchester	As above
Quaternary ammonium compound Benzalkonium chloride BP	1% solution in water	50% concentrate	Pharmacists and manufacturing chemists	Low health hazard; non-staining; wash off before applying emulsion paint; effective against algae and lichens
Gloquat C	1% solution in water	50% concentrate	ABM Chemicals Ltd, Unity Mill, Poleacre Lane, Woodley, Cheshire	As above
Mystox QL (incl Lauryl pentachlorophenate)	As directed	Liquid	Catomance Ltd, 94 Bridge Road East, Welwyn Garden City, Herts	As above; also long-term effectiveness on stone, concrete etc.
Thaltox Q (incl organotin compounds)	As directed	Liquid	Wykamol Ltd	As above
Amino compound *Nuodex 87*	1–5% solution in water	Liquid concentrate	Durham Chemicals Ltd Birtley, Co Durham	Effective against algae, lichens and fungi; non-staining and does not need rinsing off; active residual film

This list does not claim to be complete or to comment in any way on the relative merit of products; there is no significance in the order

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